Sentiment Analysis

Jaime Arguello
INLS 613: Text Data Mining
jarguell@email.unc.edu

Definitions

- Subjectivity analysis: detecting whether a span of text describes the author's internal state (e.g., opinions, evaluations, emotions, speculations) versus an objective fact

- Opinion mining: detecting whether a span of text expresses a positive/negative judgement

- Affect Detection: detecting whether a span of text conveys a particular emotion (e.g., anger, hope, disgust)

Applications

- Review summarization
- Recommendation systems
- Detecting “trolls” in social media
- Summarization of multiple viewpoints
- Text-based forecasting or “now-casting”
- eRulemaking
- …

Challenges

Challenges

- Sarcasm
- Negation
- Modal verbs (e.g., could, should, would)
- Absence of “opinionated” text (e.g., Go read the book.)
- Polarity strength
- Target resolution
- Topic-specific predictiveness of features
- …

Features

- Unigrams (presence vs. frequency)
- Higher-order n-grams (mixed results)
- Corpus frequency (Hapax legomena -- objective text is repeated)
- Part-of-speech (“love”--> love_NOUN)
- Position information (“good” --> good_END)
- Valence shifters (“don’t like” --> NOT_like)
- Target oriented features (“long” --> BATTERY_LIFE_long)
- Genre-specific features (“scary” --> HORROR_scary)
- Dependency parse features (http://nlp.stanford.edu:8080/parser/index.jsp)

Please enter a sentence to be parsed:

Despite the average character development, this was a great movie.

Language: English Sample Sentence Parse

Your query

Despite the average character development, this was a great movie.

Tagging

```
Despite/IN  the/DT  average/JJ  character/NN  development/NN  ,/,  this/DT  was/VBD  a/DT  great/JJ  movie/NN  ./.
```

Parse

```
(ROOT
  (S
    (PP (IN Despite)
      (NP (DT the) (JJ average) (NN character) (NN development)))
    (, ,)
    (NP (DT this))
    (VP (VBD was)
      (NP (DT a) (JJ great) (NN movie)))
    (. .)))
```

Universal dependencies

```
case(development-5, Despite-1)
det(development-5, the-2)
amod(development-5, average-3)
compound(development-5, character-4)
nmod(movie-11, development-5)
nsubj(movie-11, this-7)
cop(movie-11, was-8)
det(movie-11, a-9)
amod(movie-11, great-10)
root(ROOT-0, movie-11)
```

Please enter a sentence to be parsed:

The movie was not in any way terrible.

Language: English Sample Sentence Parse

Your query

The movie was not in any way terrible.

Tagging

```
The/DT  movie/NN  was/VBD  not/RB  in/IN  any/DT  way/NN  terrible/JJ  ./.
```

Parse

```
(ROOT
  (S
    (NP (DT The) (NN movie))
    (VP (VBD was)
      (ADVP (RB not)
        (PP (IN in)
          (NP (DT any) (NN way))))
      (ADJP (JJ terrible)))
    (. .)))
```

Universal dependencies

```
det(movie-2, The-1)
nsubj(terrible-8, movie-2)
cop(terrible-8, was-3)
neg(terrible-8, not-4)
case(way-7, in-5)
det(way-7, any-6)
nmod(not-4, way-7)
root(ROOT-0, terrible-8)
```

Pang and Lee, EMNLP 2002

	Features	# of features	frequency or presence?	NB	ME	SVM
(1)	unigrams	16165	freq.	**78.7**	N/A	72.8
(2)	unigrams	”	pres.	81.0	80.4	**82.9**
(3)	unigrams+bigrams	32330	pres.	80.6	80.8	**82.7**
(4)	bigrams	16165	pres.	77.3	**77.4**	77.1
(5)	unigrams+POS	16695	pres.	81.5	80.4	**81.9**
(6)	adjectives	2633	pres.	77.0	**77.7**	75.1
(7)	top 2633 unigrams	2633	pres.	80.3	81.0	**81.4**
(8)	unigrams+position	22430	pres.	81.0	80.1	**81.6**

	Proposed word lists	Accuracy	Ties
Human 1	positive: *dazzling, brilliant, phenomenal, excellent, fantastic* negative: *suck, terrible, awful, unwatchable, hideous*	58%	75%
Human 2	positive: *gripping, mesmerizing, riveting, spectacular, cool, awesome, thrilling, badass, excellent, moving, exciting* negative: *bad, cliched, sucks, boring, stupid, slow*	64%	39%

Approaches

- Classification
- Regression
- Building genre-specific classifiers
- Inferring term-polarity with seeds/conjunctions (and, but)
  - Elegant, but over-priced; clever and informative
- Inferring labels heuristically (stars, emoticons)
- Self-training
- Domain adaptation

Domain Adaptation

- Challenges
  - Some features may not appear in the target domain
  - Some features may have the opposite polarity

Domain Adaptation

source domains

books

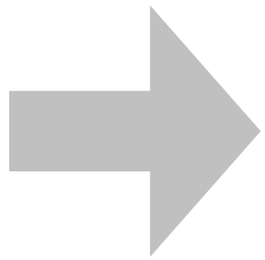
mobile phones

music albums

movies

laptops

restaurants



target domain

kitchen appliances

Related Tasks

- Detecting positive/negative judgement
- Predicting degree of positivity/negativity (regression)
- Extracting sentences that provide justification
- Extracting sentences that express comparison
- Predicting agreement/disagreement
- Viewpoint detection (pro vs. against)
- Detecting issue frames around debate